BOOK REVIEW — BUCHBESPRECHUNG

K. KÜPFMÜLLER

Einführung in die theoretische Elektrotechnik

Achte verbesserte und erweiterte Auflage. Springer-Verlag. Berlin — Heidelberg — New York. 1965. 552 Seiten mit 586 Abbildungen.

Eines der besten Bücher auf dem Gebiet der theoretischen Elektrotechnik ist zweifellos das in Fachkreisen anerkannte Buch von Professor Karl Küpfmüller. Die achte Auflage bestätigt dies in eindrucksvoller Weise. Das Buch bietet eine grundlagende Einführung in die Berechnungsverfahren und Vorstellungen der Elektrotechnik unter weitgehender Berücksichtigung der Bedürfnisse der Starkstromtechnik, der Nachrichtentechnik und der Elektronik. Das kommt umsomehr zum Ausdruck, als neben der allgemeinen Feldtheorie auch die Theorie der Netzwerke sowie die Grundlagen der modernen elektronischen Schaltungselemente behandelt sind.

Das Buch gliedert sich außer Vorwort, Einleitung, Anhang, Literatur- und Sachverzeichnis in acht Kapitel. Das erste Kapitel beschäftigt sich mit dem stationären elektrischen Strom. Zunächst werden die wichtigsten Einheiten der elektrischen und mechanischen Größen kurz zusammengefaßt, dann die Grundgesetze der Strömung in Widerstandsnetzen und räumlich ausgedehnten Strömungsfeldern erörtert.

Das zweite Kapitel ist dem stationären elektrischen Feld gewidmet. Hier werden nicht nur die Kondensatoren, die Mehrleitersysteme usw., sondern auch die Hochvakuumsröhren, die Halbleiterdioden und die Transistoren besprochen. Sogar das langsam veränderliche elektrische Feld sowie die Stromleitung und der Durchschlag in Gasen sind hier behandelt.

Das dritte Kapitel gibt die Grundbegriffe und die Grundgesetze des stationären und langsam veränderlichen magnetischen Feldes sowie die zugehörigen Berechnungsverfahren. Hier untersucht der Verfasser die Probleme der Selbst- und Gegeninduktion, die mechanischen Kraftwirkungen, die Wirbelströme und die Ummagnetisierungsverluste. Auch die Grundgleichungen der Transformatoren und der elektrischen Rotationsmaschinen sind hier kurz zusammenfaßt.

Das vierte Kapitel befaßt sich mit der allgemeinen Netzwerktheorie und mit den linearen Verstärkern.

Zum fünften Kapitel gehören die Leitungen, die Kettenleiter und die Siebketten.

Im sechsten Kapitel behandelt Verfasser die rasch veränderlichen Felder, wobei anhand der Maxwellschen Gleichungen die elektromagnetischen Wellen, Hohlleiter und Hohlraumresonatoren untersucht werden.

Das siebente Kapitel bietet eine gute Einführung in die Methoden der Untersuchung von Ausgleichsvorgängen in linearen Systemen. Hier werden nicht nur die Definitionen der Zeitfunktionen und der Spektralfunktionen gegeben, sondern auch die Probleme der Stabilität und der Selbsterregung aufgeworfen und besprochen.

Das achte Kapitel schließlich vermittelt eine gründliche Einführung in die nichtlinearen Systeme. Als Beispiele werden die gesteuerten magnetischen Elemente, die parametrischen Verstärker, die Reaktanzverstärker und die Gleichrichter dargestellt.

Die Anforderungen an mathematische Vorkenntnisse beschränken sich auf die Elemente der Differential- und Integralrechnung und auf die komplexe Rechnung. Die angegebenen Berechnungsverfahren werden durch zahlreiche praktische Anwendungsbeispiele und Zahlenbeispiele erläutert. Das Buch kann nicht nur dem Studenten, sondern auch dem Ingenieur in der Praxis als überaus nützlich empfohlen werden.

F. CSÁKI

W. E. CLASON

Elsevier's Electrotechnical Dictionary

In six languages: English, French, Spanish, Italian, Dutch, and German. Elsevier Publishing Company. Amsterdam, London, New York 1965.

It is well known that the number of scientific and technical journals, as well as the number of international congresses, symposia and committee-meetings increases in time following an exponential law. At the same time the progress of engineering sciences like electrical engineering was very great indeed. A lot of new theoretical notions and practical devices have come to light. These circumstances emphasize the necessity for good international multilingual dictionaries.

To meet this need Elsevier has planned a series of multilingual technical dictionaries, the one relating to electrical engineering was recently published. Naturally, the field of electrical engineering has become so extensive that it is very difficult to compile a special dictionary which would satisfy all requirements and demands of the various cathegories of users. The author who was formerly head of the translation department N. V. Philips' Eindhoven, the Netherlands, has selected the most important seventhousand terms dealing with the following aspects: fundamental electricity; electric energy generation; transmission and supply; electrical machines and transformers; electric traction; illumination; installation of electrical equipment; measuring apparatus; electrochemistry; electrical heating; cables; electrobiology; welding; electric lifts and elevators.

The languages have been arranged in Anglo—Saxon, Latin and Teutonic groups. It is very interesting to see the frequent differences between the British usage and the American usage of the same English terms. There is in the book a thumb-indexed alphabetical list of words for each of the five other languages, referring to the corresponding numbers in the first part.

There can be no doubt that the addition of this electrotechnical dictionary will supply new possibilities in the resolution of the complicated problems concerned with the translation of electrical engineering texts

F. CSÁKI

GY. FODOR

Laplace Transforms in Engineering

(Akadémiai Kiadó.) Publishing House of the Hungarian Academy of Sciences, Budapest, 1965.

In the book the technical problems of the mathematical method of Laplace transformation are discussed, especially those in control and electrical engineering.

In the first two Parts the t' eoretical foundations are laid down, while in Parts III to VII the various types of the technical application and some theoretical problems are dealt with. Part VIII contains the mathematical tables.

The subject of Part II are the laws of natural sciences. The various mathematical forms of the laws are discussed. The concept of the derivative is generalized for the case of functions containing discontinuities. The classical solution method of differential equations is described and the concept of integral transformations introduced.

In Part II the operational rules and theorems of the Laplace transformation are described.

In Part III the various fields of application of the Laplace transformation are discussed. such as the solution of differential equations, the rules for transfer functions, stability examinations, the Laplace transforms of various types of excitation functions and the concept of operational impedances.

In Part IV, the results obtained in Parts II and III are employed in concrete examples. The examples have been collected from a very broad range, from the fields of electricity, mechanics, thermodynamics and control engineering.

Part V is devoted to the spectrum method and the results are used for determining the transfer characteristics and the criteria of stability. The two-sided Laplace transformation is also discussed in this Part of the book.

Part VI presents the rules of the discrete Laplace transformation (Z-transformation) and its application for solving sampled-data

systems, systems with a continuous output signal and difference equations.

In Part VII random processes are examined. The individual chapters are devoted to correlation functions (autocorrelation), the power spectrum, the examination of the transfer signal, optimum systems and the sampled random signals.

The Appendices of Part VIII contain the mathematical formulae and tables. Among these, the table of inverse Laplace transforms, containing the inverse transforms of 575 functions is very comprehensive.

The work of Fodor belongs among the books discussing the application of the Laplace transformation the most intensively. The principles of the Laplace, Fourier, and discrete Laplace transformation are built up on a unified base and the calculation technique employed in the applications is also unified. The aim of the book is to present integral transformations in the most diversified technical applications. This task, which was not at all easy, has been very attractively accomplished. We may mention as a deficiency that examples on the strength of materials are missing among the examples from the field of mechanics.

The book by Gy. Fodor may reckon on the increased interest of especially electrical and control engineers.

I. VÁGÓ

J. D. ROBSON

An Introduction to Random Vibration

Edinburgh University Press, Edinburgh, Elsevier Publishing Company Amsterdam—London—New-York, 1964, VIII. 150 p.

The application of the high-speed rocket propulsion units and jet-propulsion mechanisms necessarily involved an increasing consideration of the mechanical vibrations of mechanisms subjected to stochastically varying exciting effects and of the fatigue phenomena caused by such vibrations. Similar problems arose in the dimensioning tasks connected with earthquakes or with road vehicles.

When these problems arose, the mathematical means suitable for such examinations were, at least most of them, already developed. These mathematical concepts and methods have been applied since a long time, e.g. in the research of the Brownian movement or in statistical mechanics. The application of these means is similarly of no novel nature in telecommunication engineering or in the theory of automatic control.

The consideration of stochastic processes in the theory of mechanical vibrations is comparatively more recent. This novel application has, on the one hand, acted beneficiously on the development of the aforementioned mathematical methods, on the other hand, however, have resulted most regrettably in some cases in confusions in respect to the interpretation of some concepts and terms.

The intention of the author of this book has been to give an introduction in the examination of the stochastic (random) mechanical vibratory processes. By presuming only little preliminary knowledge, the reader is introduced into the sphere of the most important concept-formations and methods. The readers are not presumed to possess even knowledge of the theory of mechanical vibrations; everything required to understand the contents of the volume has been compiled in a separate Annex.

The headings of the chapters to this book, e.g. Introduction, Statistical Analysis, Harmonic Analysis, Response to a Single Random Loading, Response Involving Cross-Correlations, Peak Distribution and Envelope Fluctuation, Simulation of Random Environments, demonstrate the subject-matter dealt with.

The drafting is clearly understandable, the selection and compilation of the subject-matter was successfully done. The volume is very suitable as an introduction in the theoretical and practical knowledge of the stochastic mechanical vibratory processes. The make-up of the book is careful and handsome, as is appropriate to its contents.

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